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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/725,431
Filing Date: December 03, 2003
Appellant(s): BRABRAND, KNUT

Robert E. Converse
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed September 4, 2007 appealing from the Office action mailed January 4, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

No evidence is relied upon by the examiner in the rejection of the claims under appeal.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,6-7, 14 and 20-21 are rejected under 35 USC 103(a) as obvious based on Prince (US6937883 as argued previously, further in view of Iizuka et al (US5355887) where Prince teaches a method and structure for non-invasive determination of a patient's diaphragm position using a one-dimensional phased array longitudinally placed over the liver and adjacent diaphragm to detect diaphragm position, the sinus being adjacent to the diaphragm and therefore being overlaid during its motion, the position of the diaphragm being determined from the beamformed aiming of the array's elements with Doppler processing for tracking of diaphragm motion during locating setup, see col. 10 lines 50 - 67. Iizuka et al merely evidences that an scanning line transducer such as placed to cross the diaphragm in ensonation will detect the diaphragm by a reflectivity or impedance difference between received signals and so can be used to track displacement for any point along that line (see figs. 7A, 11A, 10e,f,g; see col. 11, line 62 – col. 12, line 12). It would have been obvious to supplement the linear array transducer

of Prince in view of Iizuka et al's teaching of using a scanning line transducer that would function to provide signal difference information as evidenced by Iizuka et al.

Claims 2 - 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prince in view of Iizuka et al as applied to claim 1 above, and further in view of Rieder et al. previously, Riederer is directed to a method of determining the degree of lung inflation by non-invasively determining the position of the diaphragm with the MRI imaging system itself serving as a diaphragm position sensing device by using the MRI imaging display to display a truncated or navigational pulse scan along a line which transects the diaphragm at a location of its dome which is suitable to be reliably representative of the degree of inflation. During a reference point establishment phase the operator selects a 20 sample wide range over which signal edge extraction is practiced to track diaphragm location which is fed back to the patient by a corresponding 20 LED bar display so that the patient can breath-hold at the optimum diaphragm position with the MRI diagnostic mode image then taken after a short stabilizing delay. Riederer also teaches a calibration-breath-holding technique where the patient first assists in determining a diaphragm-stationary reference point for which the MR image is optimal and thereafter the diaphragm position is returned by breathholding to the stationary reference optimum while diagnostic imaging proceeds.

It would have been obvious to supplement Prince in view of Iizuka et al's teaching of using detected impedance of tissue to distinguish tracked point motion with this capability since the Doppler tracking of the diaphragm within the range gate with

triggering on the wave curve characteristics is an alternative equivalent to the time-variant LED display of the former within the 20 element range limits.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Prince in view of Iizuka et al as applied to claims 7 or above, and further in view of Riederer et al and Amazeen et al (US4431007). Whereas the former does not speak directly to impedance change in the Z-direction with respect to diaphragm movement, Amazeen et al evidences that echoes such as returning from the patient diaphragm in Prince represent density discontinuities due to impedance changes at such interfaces. Further, since Riederer et al performs the navigational referencing using a longitudinal z-gradient field scanline through the diaphragm (see col. 5 end-portion) the Prince col. 6 end-potion discussion may be understood to advise to measure z-direction movement as nearly as possible, since Doppler resolution is greatest along the direction of motion which in the case of the diaphragm is longitudinal along the patient axis.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Prince in view of Iizuka et al as applied respectively to claims 1,7 above, and further in view of Wessels et al (US6314312). Whereas the former while directed to MRI diagnosis at an optimal diaphragm position do not discuss biopsy as an associated procedure, it would have been obvious in view of Wessels et al col. 1 lines 12 - 42 and col. 6 lines 22 - 62 to track organ motion in association with biopsy in order that a small lesion such as P within the liver may be accurately targeted using the ultrasound as part of the tracking where ultrasound is used such as in Prince.

Claims 11 - 12, 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prince in view of Iizuka et al as applied to claim 7 above, and further in view of Hernandez-Guerra et al (EP 0 940 158 A1, of record with the 7/19/04 IDS). Whereas the former is silent as to the use of an ultrasound-array-based non-invasive diaphragm position and motion tracking system for radiation therapy, it would have been obvious in view of Hernandez-Guerra et al to utilize such a device for triggering radiotherapy in association with target movement for the reason provided in the latter, namely that a non-invasive diaphragm tracking subsystem (the SEFE redundant parameter system described in paragraphs [0049] - [0053]) allows for long treatment times not feasible by breath-holding alone, Prince also being not relegated to a breath-holding application.

Claims 1, 12-13 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Hernandez-Guerra et al further in view Prince and Iizuka et al, since the former meets the claimed limitations (in the case of claim 13 since CPU 18 controls the radiotherapy source head positions) save that diaphragm position is not used as the non-invasive respiratory motion parameter however since the document states in paragraph 53 that diaphragm movement is being tracked then the latter merely provide practicalization thereto, albeit without 4-parameter redundancy which the SEFE algorithm provides.

Mostafavi (US6937696) is cited as of interest in showing fluoroscopic tracking of the diaphragm for radiation therapy triggering, see col. 23 lines 1 - 18.

Feinberg et al (International Published Application WO-02/41776, of record) like Prince is directed to whole-image tracking of displacement (inter alia by regional

displacement measurement across successive frames) using a longitudinally positioned ultrasound array, see Fig. 10.

Sontag et al (US6298260) like Hernandez-Guerra uses SEFE-based respiratory triggering.

Schweikard et al detects respiratory motion during treatment regimens.

(10) Response to Argument

In response to applicant's argument to claims 1 and 7, that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to supplement the linear array transducer of Prince in view of Iizuka et al's teaching of using a scanning line transducer that would function to provide signal difference information as evidenced by Iizuka et al. (see col. 11, line 62 – col. 12, line 12).

In reference to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Prince teaches a method and structure for non-invasive determination of a patient's diaphragm position using a one-dimensional phased array longitudinally placed over the liver and adjacent diaphragm to detect diaphragm position, the sinus being adjacent to the diaphragm and therefore being overlaid during its motion, the position of the diaphragm being determined from the beamformed aiming of the array's elements with Doppler processing for tracking of diaphragm motion during locating setup, see col. 10 lines 50 - 67. Iizuka et al merely evidences that an scanning line transducer such as placed to cross the diaphragm in ensonation will detect the diaphragm by a reflectivity or impedance difference between received signals and so can be used to track displacement for any point along that line (see figs. 7A, 11A, 10e,f,g; see col. 11, line 62 – col. 12, line 12). It would have been obvious to supplement the linear array transducer of Prince in view of Iizuka et al's teaching of using a scanning line transducer that would function to provide signal difference information as evidenced by Iizuka et al.

In response to applicant's arguments to dependent claims 2-3, 6, 9-14 and 17-21. The examiner of record disagrees with applicant's assertions and maintains the 103 rejections as presented in the previous office action for substantially the same reasons as discussed above with reference to claims 1 and 7, since claims 2-3, 6, 9-14 and 17-21 depend from independent claims 1 and 7.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/John F Ramirez/

Examiner, Art Unit 3737

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